The ALS storage ring typically operates in two distinct modes: "multi-bunch" and "two-bunch" modes.

Multi-bunch mode is the standard user operations mode in which the storage ring is filled with 276 bunches of electrons for a total current of 400 mA, which then decays to ~200 mA over 8 hours. There is also a cam-shaft bunch (bucket 318) used for timing or slicing experiments at the ALS. Because the spacing between bunches (~2 ns) is shorter than the response time of our instruments in rapid scan mode, the infrared light from the ALS is essentially continuous from our perspective. In step scan mode, however, it is possible to take advantage of the pulsed nature of the synchrotron radiation for experiments requiring fast timing.

In two-bunch mode, only two bunches of electrons are filled, usually at 25 mA per bunch. The lifetime in two-bunch mode is considerably shorter and the beam is typically refilled every two hours. The spacing between bunches in two-bunch mode is 328 ns, compared to 2 ns in multi-bunch mode. Two-bunch mode is especially useful for time for time-of-flight (TOF) experiments, in which one detector records an event (e.g., the ionization of an atom) and a second detector some distance away records the arrival times of particles (e.g., electrons) generated by that event, yielding a complete energy spectrum of ejected particles. This approach considerably reduces background noise levels compared to using electrostatic or magnetic spectrometers with the storage ring in multi-bunch mode. Two-bunch mode is not suitable for our FTIR instruments. No beamtime is allocated during two-bunch mode operation.